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February 17, 2015

U.S. Army Corps of Engineers, Mobile District
P.O. Box 2288
Mobile, AL 36628–0001

Attention: Colonel Jon J. Chytka

Subject: EPA Comments on the Final Environmental Impact Statement (FEIS) for the Update of the Water Control Manual for the Alabama-Coosa-Tallapoosa (ACT) River Basin; Alabama and Georgia.
CEQ #:20140317; ERP #: COE-E39188-00

Dear Colonel Chytka:

Pursuant to Section 309 of the Clean Air Act (CAA) and Section 102(2)(C) of the National Environmental Policy Act (NEPA), the U.S. Environmental Protection Agency (EPA) reviewed the Final Environmental Impact Statement (FEIS) update of the Water Control Manual (WCM) for the proposed project. EPA provided draft EIS comments on May 31, 2013, participated in a scoping and public meeting held on October 22, 2008, and March 25, 2013, respectively, as well as two interagency webinars on September 11, 2008, and April 2, 2013. EPA formally requested an extension to submit comments on the FEIS to the USACE that was granted until February 17, 2015. This letter is intended to provide EPA's FEIS comments on the proposed project. Our comments are focused on the FEIS and the USACE's response to our DEIS comment letter.

The purpose of the project is to update the WCM for the Alabama-Coosa-Tallapoosa (ACT) River Basin. The operations at each federal reservoir managed by the U.S. Army Corps of Engineers (USACE) are described in a master WCM, which includes WCMs for the operation of the ACT Basin and for the individual USACE projects within that system. The WCM describes how federal projects within the basin should operate in order to meet their authorized purposes and other statutory requirements. The WCM should provide for operations that comply with state water quality standards, which includes not creating conditions that impair water quality standards, consistent with the authorized purposes of the project. The authorized project purposes, the incidental benefits recognized in project authorizations, and objectives that result from other general authorities contained in congressional legislation for which the USACE operates each listed project within the ACT River Basin include flood risk management, hydropower, navigation, water supply, water quality, fish and wildlife conservation, and recreation. Other non-Federal dams located on the Coosa and Tallapoosa Rivers include 11 projects owned and operated by the Alabama Power Company (APC). Operations between the

Alabama Power Company (APC) projects and the federal projects are coordinated as necessary to meet flood control, water quality and quantity, and water supply demands. For example, in order for the USACE to develop an effective drought contingency plan for the basin, APC projects had to be incorporated into the plan since these project store 78 percent of the water resources.

According to the FEIS, Corps states that the preferred alternative "G" will result in adverse impacts to water resources but concludes that these impacts are generally negligible. Impacts include hypoxia in the tailwaters of Lake Allatoona, algal growth in the headwaters of Weiss Lake, and temperature or oxygen demand impacts in the Coosawattee, Oostanaula, Tallapoossa, and Alabama rivers. However, EPA believes that water quality impacts that will result from the USACE's proposed actions for water management in the ACT have not been adequately disclosed in the FEIS in part because the results from the models used lack the temporal, spatial and mechanistic precision to quantify the impacts on the water quality standards applicable under the Clean Water Act. Therefore, we recommend that the USACE use a more precise modeling framework in determining impacts to water quality within the Upper Coosa watershed under the newly proposed regulation schedule. This effort will provide a better determination of potential changes in water quality.

The USACE acknowledges that its operational decisions will have water quality impacts but, citing constraints in the district's authority, refutes the responsibility to comply with that aspect of the CWA. Instead, the USACE recommends that States and other stakeholders address the consequences of the USACE's operational decisions. Changes to the ambient water quality of the ACT basin arising from implementing the preferred alternative may necessitate corrective actions including, additional water quality monitoring, developing or revising numeric nutrient criteria, developing or revising total maximum daily loads (TMDLs) for various pollutants, implementing revised TMDLs, modifying National Pollutant Discharge and Elimination System (NPDES) permit limits for point sources as well as funding projects to mitigate impacts from nonpoint sources within the ACT.

In the response to DEIS comments, EPA notes that the FEIS states that, "The WCM update may result in minor adjustments to 7Q10 flows upon which NPDES permits are based. (Executive Summary page ES-88 and Section 6.10). Additionally it states that, Adjustment of NPDES permits in response to any of these minor changes will be the responsibility of the respective states that manage the NPDES program." EPA disagrees. Pursuant to the CWA and the USACE's guidance regulations at ER1110-2-8154, compliance with water quality standards means that the existing instream water uses and the water quality necessary to protect them will be maintained. While it is true that States with delegated NPDES programs must ensure that discharges of pollutants to waters of the United States meet State water quality standards, the USACE cannot, through its operational decisions, create conditions (e.g., decreased flow) that cause permittees to fall out of compliance. Based on our review of the FEIS, EPA continues to be concerned about the potential for significant environmental and economic impacts resulting from the preferred alternative and we recommend that the USACE more appropriately identify these impacts so that all stakeholders, including the regulated and regulatory community, can better understand how they will be affected by the proposed actions in the ACT WCM update.

In summary, EPA reiterates that the WCM should provide for operations that comply with state water quality standards, which includes not creating conditions that impair water quality standards, including downstream uses and adequate flows to protect the designated use, consistent with the authorized purposes of the projects. EPA believes that the potential impact to water quality on the Coosa system has not been fully disclosed based on the modeling undertaken by the USACE in the FEIS. The potential exists for these operational changes to result in the impairment of state water quality standards and significant impacts to stakeholders on the system (e.g., NPDES permit holders). Therefore, EPA recommends the USACE undertake additional water quality modeling using existing dynamic modeling developed for the upper Coosa Basin to verify that these adverse impacts will not be realized by the proposed action. To the extent water quality impacts are identified, EPA recommends that the USACE select an alternative that minimizes adverse impacts to water quality standards, to the maximum extent feasible, which includes not creating conditions that impair water quality standards, consistent with the authorized purposes of the project. Also, due to the uncertainty that remains regarding water quality impacts and the proposed action, a mechanism should be developed that includes Federal and State Agencies to ensure that the water quality monitoring results are used to appropriately inform decision-making (i.e. operation schedules). EPA notes that the resolution of these outstanding and important issues should be addressed and/committed to in the Record of Decision (ROD) for this action. Therefore, we request a copy of the draft ROD for our review.

EPA also reiterates the importance of using appropriate water quality assessment protocols and/or models for future USACE projects and WCM updates within the Region to ensure that water quality impacts are adequately disclosed in the NEPA process. For more detailed comments on our concerns including water quality, water supply/efficiency, aquatic life/endangered species, wetlands/streams, and climate change please see the attachment.

We appreciate the opportunity to provide comments on the proposed WCM FEIS for the ACT basin and look forward to working with you to resolve our remaining concerns. If you have any questions regarding our comments, please contact Ntale Kajumba (404/562-9620) of the NEPA Program staff.

Sincerely,

Heinz J. Mueller, Chief
NEPA Program Office

James Giattina, Director
Water Protection Division

Attachment: EPA Detailed Comment

EPA's Detailed Comments on the Water Control Manual Update FEIS for the ACT River Basin

Alternatives

The FEIS addresses a no action and three action alternative (Plan A, Plan F and Plan G). The no-action alternative involves no change in how the dams are currently managed. The USACE's preferred alternative (Plan G) is identified in the FEIS. The proposal includes the following:

- **Implements Basin Drought Operations Plan:** includes triggers and dam releases/flow targets to conserve storage and provide reduced levels of service during drought
- **Navigation Plan:** includes triggers to reduce (9.0' or 7.5' channel) or suspend navigation level of service based on system storage
- **Minimum Flows:** implements seasonal minimum flows at Carters when reservoir storage level supports
- **Hydropower:** variable hydropower generation at Allatoona based on action zone and time of year
- **Revised Guide Curves:** H. Neely Henry (APC) and Allatoona
- **Revised Action Zones:** Allatoona and Carters
- **Water Supply:** no change in existing contracted amounts
- **Alabama Power Company Projects (APC):** continued operation under current FERC licenses

Recommendations: EPA appreciates that a preferred alternative was identified early in the EIS process (Plan G). EPA's review of the FEIS has focused on water quality, water supply/efficiency, aquatic life/endangered species, wetlands/streams, and climate change.

Water Resources

Water Quality

State water quality standards programs include designated uses, criteria to protect those uses, and an antidegradation policy (CWA Section 303(c); 40 CFR § 131). Section 401 of the CWA additionally protects these water quality standards, requiring state certification that federal activities which may result in any discharge will comply with state water quality standards. Further, Section 404(b)(1) Guidelines state that no such work shall be permitted if it would cause or contribute to "violations of any applicable State water quality standard" (40 CFR § 230.10(b)(1)), or if it would "cause or contribute to significant degradation of the waters of the United States" (40 CFR § 230.10(c)).

The revised WCM should provide for operations that comply with state water quality standards, which includes not creating conditions that cause water quality standard violations, consistent with the authorized purposes of the projects. It should also provide for the attainment and maintenance of all downstream uses (40 CFR § 131.10 (b)), including physicochemical parameters, nutrient standards, and the flows necessary for protection of the designated use.

EPA noted in particular water quality parameters of concern in the Coosa Basin, and the need for specific analysis, in its 2013 DEIS comments:

> "...there are several waters impaired for nutrients in the basin, including Lakes Allatoona, Carters and Weiss. Changes in operations can have substantial impacts on nutrient dynamics... For example, chlorophyll-a response in Lake Weiss is very sensitive to retention time increases from withdrawals... The impacts of the proposed alternative should be evaluated to ensure that flow changes do not contravene nutrient control and total maximum daily load (TMDL) restoration efforts by Alabama Department of Environmental Management (ADEM) and Georgia Environmental Protection Division (GAEPD)."

The USACE acknowledged the availability and utility of the models used to develop the aforementioned water quality standards and TMDLs:

> "A number of other government and private agencies manage water resources in the ACT Basin. These agencies have developed models and tools to answer specific water quality related questions throughout the basin. Table 2.1-33 lists the water quality models and tools developed by state and federal agencies for mainstem waterbodies in the ACT Basin... Georgia EPD is developing watershed, in-stream, and reservoir water quality models for Allatoona Lake and Carters Lake to support TMDL development; additional watershed and in-stream models are being developed in the ACT Basin as part of the Georgia SWP... Those tools will be used to develop TMDLs and to make management decisions."

This modeling framework was built with collaboration amongst EPA, ADEM, and GA EPD, expending approximately 1.5 million dollars to develop a scientifically defensible framework for water quality analysis. The USACE evaluated water quality impacts using HEC ResSim (hydrologic model) and HEC5-Q (water quality model). According to the FEIS, the HEC 5-Q model was used because of its "ability to simulate the entire riverine and reservoir system in a single model" and it includes both point source and nonpoint source loads." However, the results from the models, are inconsistent with actual hydrologic and water quality conditions that have been observed by EPA and the States. It is therefore unclear why more dynamic (site specific) water quality models that have already been calibrated, verified and used by ADEM, EPA, and the USACE were not used to evaluate water quality impacts within the ACT Basin, particularly in areas of high concern and interest such as the reservoirs located in the Coosa River Basin (i.e., Weiss). These site-specific sophisticated modeling frameworks were developed by Federal and State Agencies to ensure that appropriate water quality decisions were made.

Since a more generic and less precise modelling framework was used for the FEIS analysis that lacks the spatial, temporal specificity, and mechanistic precision, to determine impacts of the action on water quality standards, EPA would like to strongly reiterate that the USACE must fully disclose the likely water quality impacts of the WCM, particularly in the Upper Coosa Basin, including Lakes Allatoona, Carters, and Weiss, and the intervening rivers reaches. This additional analysis should employ either the existing water quality modeling framework used for deriving water quality criteria, TMDLs, and NPDES permit limits (using linked watershed, 3D

hydrodynamic and water quality models) or a modelling framework with similar precision. Model outputs should be expressed with adequate spatial and temporal specificity to demonstrate that the authorized use of water quality will be balanced under the WCM, as measured by the magnitude, duration and frequency components of the water quality standards applicable under the CWA, particularly for the chlorophyll-a and dissolved oxygen parameters. Additionally, the analysis should demonstrate, in particular, that the increases in retention time from changes in October draw down rates will not adversely or substantially impact the water quality authorized use for Lakes Allatoona, Carters, and Weiss and the designated uses of these waterbodies. Likewise, the FEIS states that "DO in the tailwaters of Allatoona Lake drops below 4 mg/L during the summer and through early fall, and can reach as low 1 mg/L in the tailwaters…" The proposed WCM operations do not ensure that tailwater dissolved oxygen levels will be maintained at or above state water quality standards. Georgia's Water Use Classifications and Water Quality Standards at 391-3-6-.03(6)(c)(i) for dissolved oxygen require, "A daily average of 5.0 mg/L and no less than 4.0 mg/L at all times for waters supporting warm water species of fish."

Regarding the aquatic life use, EPA would like to reiterate the suggestions provided in the "Draft Fish and Wildlife Coordination Act Report on Water Control Manual Updates for the Alabama – Coosa – Tallapoosa River Basin in Alabama and Georgia" (dated December 2012). EPA suggests the use of multiple endpoints to demonstrate the protection of aquatic life designated uses. In addition to the applicable water quality standards for chemical and biological integrity of the water body, relevant endpoints for maintenance of the physical integrity of river reaches include floodplain connectivity (inundation, maintenance of off-channel habitats, wetted perimeter, out-of-bank habitats).

In addition, EPA recommends that drought contingency plans be formally coordinated with dischargers (especially NPDES permit holders) and water intake permitees (including public drinking water suppliers, cooling water intakes, industrial users, etc.) to ensure that drought operations are adequately considered in permit limits and discharger operations.

The USACE' response to comments states that:

> USACE agrees with the environmental importance of natural flow regimes. However, the USACE reservoirs were authorized by Congress and constructed expressly to alter the natural flow. The comment recommends that fish and wildlife and other interests associated with the aquatic environment in general be maximized. The USACE position is to balance all authorized project purposes including fish and wildlife, recreation, navigation, hydropower, etc. Given this need for balance, the USACE attempts to provide flows for the benefit of fish and wildlife to the extent practicable given limitations of statutory authority, infrastructure and funding limitations. In regards to specific project limitations it must be pointed out that Carters Lake has a unique feature in the re-regulation pool which allows varying monthly releases for 7Q10 minimum flows in order to mimic a more natural condition downstream. That feature is not present at the other facilities. Allatoona Lake is designed as a hydropower peaking facility and would require extended periods not producing any hydropower to provide

> anything approaching a natural flow regime. Additionally, Allatoona has a major flood management function which necessarily requires controlling peak flows downstream. On the Alabama River, the three USACE projects (R.F. Henry, Millers Ferry and Claiborne) are all run-of-river systems and for the most part pass whatever water they receive from upstream through the reservoir. This fact makes these three projects entirely dependent on upstream hydrology and releases by the Alabama Power Company (APC) projects.

Neither of the approaches selected for releasing flows from Carters Lake or Allatoona Lake demonstrate an evaluation of compliance with water quality standards, in particular protection of the designated use of aquatic life as it relates to flow releases. The ACOE has selected a minimum flow regime of monthly variable 7Q10 flows. Current scientific research indicates that flow criteria should support the natural flow regime as a whole, and that standards for minimum flow alone are not sufficient for maintaining ecosystem integrity. Minimum flow standards do not address the full range of seasonal and interannual variability of the natural flow regime. The natural fluctuation of water in rivers and streams is critical for maintaining aquatic ecosystems because aquatic biota have developed life history strategies in response to these fluctuations. Comprehensive flow criteria not only identify flow needs (i.e., magnitude) but also the timing and duration required to support ecosystem health. While some minimum flow measures currently in use, such as the 7Q10 design flow (the minimum seven day average flow likely to occur in a 10-year period), may specify a magnitude and duration, their main purpose is to determine pollutant discharge rather than support the flow requirements of aquatic ecosystems. The analysis of the flow releases from both Carters Lake and Lake Allatoona should demonstrate whether the alterations to the flows regimes will comply with water quality standards and support the aquatic life designated use.

In the FEIS, the USACE acknowledges that its operational decisions will have water quality impacts but, citing constraints in the district's or agency's authority, refutes the responsibility to comply with that aspect of the CWA. Instead, the USACE recommends that States and other stakeholders address the consequences of the USACE's operational decisions. For example, the FEIS states that,

> [t]he overall effect of the Proposed Action Alternative on water quality would be expected to be negligible. State agencies would continue to apply adaptive management techniques to more precisely define the ACT system's assimilative capacity. Water management activities may affect water quality under low flow conditions such that the state regulatory agencies may consider reevaluation of NPDES permits to confirm the system's assimilative capacity… During low-flow conditions, some NPDES permits limit point source discharges, and permit conditions may be temporarily changed during extreme low-flow conditions.

Additionally, the FEIS acknowledges that during dry periods the proposed action, "would be expected to increase algal growth in the headwaters of Weiss Lake," but notes this did not happen in the model's predicted critical year. The FEIS also states that,

> USACE also did not carry forward for further consideration management measures that change minimum releases or minimum flows to ensure other entities meet their federal clean water compliance requirements in the future. USACE does recognize existing minimum flow requirements but is not authorized to operate projects to ensure compliance by others; the use of Allatoona Lake releases to ensure discharges by municipalities and industries comply with the CWA are also not within USACE authority. States have the regulatory authority to ensure that discharges to surface water meet permitted standards.

The EPA disagrees with these statements. The USACE, like all federal agencies, is required to comply with all federal, state, interstate, and local requirements including water quality standards when developing a Water Control Manual, which includes not creating conditions that impair water quality standards, consistent with the authorized purposes of the dam. These requirements are found in the CWA, Executive Orders, promulgated regulations, and the USACE's own guidance.

Section 313 of the CWA addresses federal facilities pollution control. Under Section 313, each agency of the federal government with jurisdiction over any property or facility or engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants, shall be subject to and comply with all federal, state, interstate, and local requirements … respecting the control and abatement of water pollution.

Similar language and requirements are found in Executive Order 12088, 43 FR 47707, Oct. 17, 1978: "[t]he head of each Executive agency is responsible for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution with respect to Federal facilities and activities under the control of the agency." The USACE must also follow its regulations including, for example, 33 CFR § 222.5(f)(1), which requires the USACE to prepare water control plans giving appropriate consideration to all applicable Congressional Acts relating to operation of Federal facilities.

In addition to federal laws, Executive Orders, and promulgated regulations, the USACE has also published regulatory guidance related to water control manuals and water quality. Relevant guidance includes, ER1110-2-8154, *Water Quality and Environmental Management for Corps Civil Works Projects*, and ER1110-2-8156, *Preparation of Water Control Manuals*. These Environmental Regulations (ERs) identify the USACE's responsibility to address water quality. In the EIS, the USACE acknowledges its responsibility to follow its own guidance when updating WCMs. According to the EIS:

> In accordance with ER 1110-2-8154, USACE has an objective to ensure that water quality, as affected by a USACE project and its operation, is suitable for project purposes, existing water uses, and public safety and is in compliance with applicable federal and state water quality standards. The effects of considered water management changes on water quality in USACE reservoirs will be taken into account when updating the water control plans and manuals.

In sum, given the approach the USACE has taken by focusing on system wide modeling, the EPA is concerned that the record does not demonstrate that the USACE: 1) accurately quantified the water quality impacts for the various regulation options considered; and 2) selected the option that complies with water quality standards to the maximum extent feasible, which includes not creating conditions that impair water quality standards, consistent with the authorized purposes of the projects.

Recommendations:

EPA recommends that USACE: 1) accurately quantify the water quality impacts for the various regulation options considered using site-specific sophisticated modeling frameworks already available for this basin; and 2) select the option that complies with water quality standards to the maximum extent feasible, which includes not creating conditions that impair water quality standards, consistent with the authorized purposes of the dam.

EPA recommends analyzing the effects of the WCM operations on water quality standards, with a particular emphasis on physiochemical endpoints such as dissolved oxygen and other numeric water quality standards, biological endpoints such as sensitive aquatic species and physical endpoints that protect the designated aquatic life use, including adequate flows to maintain the physical integrity of habitat

Wetlands and Streams

As described in our comments on the DEIS, impoundments can fragment aquatic ecosystems, with impacts on many aspects of environmental integrity, particularly when the cumulative effects of multiple impoundments across a system are taken into account. Although the projects subject to the WCM are already in place, the allocations and uses allowed and established through the WCM revision can have significant influence on overall ACT system health by preventing further fragmentation. If managed to make the best use of these existing resources, further impacts of additional supply infrastructure development could be avoided or at least minimized. To be consistent with the Section 404(b)(1) Guidelines, the WCM should facilitate holistic management of basin resources such that the total impact is minimized, and entities seeking water allocations should pursue alternatives that are the least environmentally damaging both in a local context and on a basin scale whenever possible.

Unimpeded physical continuity of the major ACT rivers with their floodplains, including riparian wetlands, is also controlled in large part—or in the case of the Coosa and Alabama Rivers, nearly completely—by the management approach set forth in Water Control Manuals. Access to floodplains is critical to river sediment and chemical dynamics, hydrating riparian floodplains, and maintaining vegetation and habitat important in the lifecycles of many species, both aquatic and terrestrial, with characteristics adapted to such ecosystems. Managing flows for magnitude, seasonality, and variability that mimic natural conditions such that rivers have regular access to their floodplains is protective of riverine ecosystems and can reduce impacts to wetlands.

Recommendations: EPA appreciates that, as described in the response to comments, no additional allocations are currently proposed for the impoundments that are the subject of this EIS. However, we also note, as discussed in section 4.2.6 and Appendix C, that "the available storage under existing water supply agreements at USACE reservoirs may not be sufficient under all conditions to accommodate the 2006 level of water supply withdrawals from those reservoirs." Given this gap between storage and withdrawal levels, EPA continues to recommend that the USACE work with those entities granted allocations, as well as with any entity that requests a new or additional allocation in the future, on optimizing conservation and efficiency of use. Such optimization of existing infrastructure in the ACT Basin, in balance with environmental uses such as protection of habitat, aquatic life, and water quality, is meant to minimize impacts to aquatic resources on the whole for the basin.

Water Supply Efficiency/Conservation

When evaluating requests for allocations and uses related to the projects in the ACT Water Control Manual now and in the future, the USACE should consider whether efficiency and conservation measures are in place to ensure that the overall use of USACE lakes minimizes impacts to aquatic resources. Minimizing supply withdrawals with conservation measures can reduce conflicts among uses, easing pressure on the ACT system as a whole, and easing management of releases and flows for environmental protection. EPA Region 4's 2010 Guidelines on Water Efficiency Measures for Water Supply Projects in the Southeast ("WEGs") describes conservation and efficiency measures that can be expected of users seeking allocations or withdrawals from the system, and should be used to evaluate how well efficiency is being implemented before committing to new allocations or uses. We especially encourage that any entity seeking allocations demonstrate meaningful efforts to repair leaking infrastructure; use an integrated resource management approach across residential, industrial, agricultural, and commercial settings; implement full-cost pricing, conservation pricing, and metering of all water users; use low-impact development and green infrastructure; facilitate retrofitting of buildings; optimize water reuse; and facilitate landscaping to minimize demand and waste, and implement efficient irrigation practices. Protecting basin flows through conservation and efficient use can reduce impacts to streams and riparian wetlands, aquatic life, habitat, and water quality, and can ease management of system flows, particularly under low-rainfall conditions.

Recommendations: EPA appreciates the agreement expressed in the response to comments that implementing improved water conservation and efficiency measures is an important consideration for developing new water supply sources. We also note their importance in considering new or proposed modifications of existing sources, as well as in resolving competition among different uses, both instream (e.g., habitat, maintenance of hydrologic regime) and offstream (e.g., human uses such as drinking water).

Aquatic Life and Endangered Species

EPA notes that the U.S. Fish & Wildlife Service (FWS) has been actively engaged in the WCM and DEIS and has submitted two recent comment letters to the USACE regarding the protection of threatened and endangered species within the Basin. EPA also notes that the FEIS indicates that the USFWS concurred with the USACE that Plan G will not likely affect federally listed Threatened and Endangered Species.

Recommendations: EPA principally defers to FWS on this project. The EIS emphasizes the importance of water quality to aquatic life in the ACT basin: "Water quality degradation is a frequently cited concern for the riverine-dependent species included in the Comprehensive Study's Protected Species Report (Ziewitz et al. 1997). It is quite likely that water quality is a limiting factor for several of the species, including many of the 16 federally listed mussels listed in Table 2.5-11. Any actions that could alter water quality should address effects on the protected species."

Climate Change

In reference to the greenhouse gas emissions of the preferred alternative, the FEIS states that, "No GHG emissions would be associated with Plan G, and the plan would not have any direct effect on the climate or contribute to global warming." Likewise, the FEIS notes: "No GHG emissions would be associated with Plan G, and it would not have any direct effect on the climate or contribute to global warming." The FEIS does not provide any further explanation for this conclusion, and fails to disclose the impacts referenced in EPA's DEIS comments,

> "There is an expanding body of literature on the greenhouse gas contributions (CO_2, CH_4, N_2O) of reservoirs (Varis, Kummu, Härkönen, & Huttunen, 2012). Emissions pathways include flux across the air-water interface, from supersaturation in the sediment, releases immediately below the turbines and further downstream (Diem, Koch, Schwarzenbach, Wehrli, & Schubert, 2012)."

The USACE response to EPA's DEIS comments (found in Appendix B), further assert that, "Project operation activities make a negligible overall contribution to greenhouse gas emissions, and operation of the project to generate hydroelectric power makes an important positive contribution to efforts to reduce greenhouse gas emissions in lieu of the use of fossil fuels." Beyond these statements, no further data or analysis is provide to support this conclusion.

Moreover, recent research indicates that shallow embayments may be a particular hotspot for methane production in reservoirs and may be substantially impacted by reservoir operations (particularly the range of pool elevations) which are managed under the WCM. Recent research also indicates that temperature reservoirs may be a source of greenhouse gases on par with the previously acknowledged contributions of tropical reservoirs.

Although the synopsis of the sensitivity analysis under future climate scenarios notes that, "…[t]here would likely be some expected adverse effects on water quality and biological resources as a result of the Plan G-TI scenario," it concludes without adequate explanation that,

"these overall effects would be minor." The USACE noted in EPA's DEIS comments, "potential impacts of climate change on the ACT water budget are manifold: changing precipitation patterns, increased evapotranspiration, and decreased soil moisture." Therefore, the conclusions that "these overall effects would be minor" lacks the necessary specificity for full disclosure.

Recommendations: The FEIS and ROD should disclose the potential impacts of dam operations in the ACT on greenhouse gases and climate change, as well as the impacts of climate change on WCM operations. EPA suggests an integrated water management approach in response to these impacts.